VINYL BROMIDE

Vinyl bromide is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 593-60-2 $H_2C=CHBr$

Molecular Formula: C_2H_3Br

Vinyl bromide is a gas under normal atmospheric conditions and a colorless liquid under pressure. It has a characteristic pungent odor. It is soluble in chloroform; miscible in ethanol, ethyl ether, acetone, and benzene; and insoluble in water (HSDB 1991).

Physical Properties of Vinyl Bromide

Synonyms: bromoethene; bromoethylene; NCI-C50373; monobromoethylene

Molecular Weight:	106.96
Boiling Point:	15.8 °C
Melting Point:	-139.5 °C
Vapor Density:	3.7 (air = 1)
Density/Specific Gravity:	1.4738 at 25/4 °C (water = 1)
Vapor Pressure:	895 mm Hg at 20 °C
Log Octanol/Water Partition Coefficient:	1.57
Conversion Factor:	1 ppm = 4.37 mg/m^3

(HSDB 1991, Sax 1987, Sax 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Vinyl bromide is used as a flame-retarding treatment for acrylic fibers. It is also used in leather and fabricated metal products, for preparing films, for impregnating or laminating fibers, and for rubber substitution. Vinyl bromide may form in the air as a degradation product of 1,2-dibromoethane (HSDB, 1991).

B. Emissions

No emissions of vinyl bromide from stationary sources in California were reported, based on data obtained from the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

It is not known whether vinyl bromide occurs naturally (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of vinyl bromide.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of vinyl bromide was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Vinyl bromide exists in the atmosphere in the gas phase. The dominant atmospheric loss process for vinyl bromide is by reaction with the hydroxyl radical. Based on this reaction, the atmospheric half-life and lifetime of vinyl bromide is estimated to be 1.5 days and 2.1 days, respectively (Atkinson, 1989). The expected reaction products are formaldehyde and formyl bromide (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Vinyl bromide emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

The probable route of human exposure to vinyl bromide is inhalation (Sittig, 1991).

Non-Cancer: At high concentrations, vinyl bromide is an eye and respiratory tract irritant and a central nervous system depressant. High concentrations may also cause dizziness, disorientation, and sleepiness in humans. Acute inhalation exposure caused liver and kidney damage and neurological effects in rats. Chronic exposures may cause liver injury (Sittig, 1991; U.S. EPA, 1994a).

The United States Environmental Protection Agency (U.S. EPA) has established a Reference Concentration (RfC) of 0.003 milligrams per cubic meter for vinyl bromide based on hypertrophy and basophilic and eosinophilic foci in the liver of rats. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects. The U.S. EPA has not established an oral Reference Dose (RfD) for vinyl bromide (U.S. EPA, 1994a).

No information is available on adverse developmental or reproductive effects of vinyl bromide in humans or animals (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of vinyl bromide in humans. Vinyl bromide is a potent animal carcinogen. Rats exposed to vinyl bromide by inhalation have produced liver angiosarcomas. The U.S. EPA has classified vinyl bromide in Group B2: Probable human carcinogen (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified vinyl bromide in Group 2A: Probable human carcinogen (IARC, 1987a). The State of California has determined under Proposition 65 that vinyl bromide is a carcinogen (CCR, 1996).